

WHAT IS CLAIMED IS:

1. A gate valve apparatus comprising:

a valve body having a rectilinear exhaust flow path formed therein to extend from a chamber port to a pump

5 port; and

a main valve provided in said valve body, said main valve including a main valve element and a main valve seat, said main valve element being movable within a travel space in a direction parallel to an axis of said exhaust
10 flow path, so that when said main valve element is in a sealing position, a main valve seal for said main valve element contacts said main valve seat to block communication through said exhaust flow path, and when it is in a non-sealing position, said main valve element is
15 separated from said main valve seat by a predetermined distance and moved in a direction perpendicular to the axis of said exhaust flow path so as to be accommodated in an accommodating chamber;

wherein said main valve seal is provided on an
20 abutting surface of said main valve element, and an annular projection is provided on an inner wall surface of said accommodating chamber, so that when it is in the non-sealing position, said main valve element is moved toward the inner wall surface of said accommodating chamber to
25 bring an outer peripheral portion of said main valve element into contact with said annular projection, whereby said main valve seal is shielded from radicals and plasma in exhaust gas by said main valve element, said annular

projection and the inner wall surface of said
accommodating chamber.

2. A gate valve apparatus according to claim 1,
wherein either one of annular groove and an annular cut
5 portion is formed on an outer peripheral portion of the
abutting surface of said main valve element radially
outward of said main valve seal, so that said annular
projection is fitted into said annular groove or annular
cut portion when said main valve seal is in the shielded
10 position.

3. A gate valve apparatus according to claim 1,
wherein when said main valve seal is in the shielded
position, an outer peripheral surface of said main valve
element is fitted to an inner peripheral surface of said
15 annular projection.

4. A gate valve apparatus according to claim 1,
wherein when said main valve seal is in the shielded
position, an outer peripheral portion of the abutting
surface of said main valve element that is radially
20 outward of said main valve seal is abutted against said
annular projection.

5. A gate valve apparatus comprising:
a valve body having a rectilinear exhaust flow path
formed therein to extend from a chamber port to a pump
25 port; and

a main valve provided in said valve body, said main
valve including a main valve element and a main valve seat,
said main valve element being movable within a travel

space in a direction parallel to an axis of said exhaust flow path, so that when said main valve element is in a sealing position, a main valve seal for said main valve element contacts said main valve seat to block
5 communication through said exhaust flow path, and when it is in a non-sealing position, said main valve element is separated from said main valve seat by a predetermined distance and moved in a direction perpendicular to the axis of said exhaust flow path so as to be accommodated in
10 an accommodating chamber;

wherein said main valve seal is provided on an abutting surface of said main valve element, and a shielding ring is secured to an outer peripheral portion of the abutting surface of said main valve element that is
15 radially outward of said main valve seal, and further an annular groove is formed on said main valve seat, so that when said main valve element is in the sealing position, said shielding ring is positioned in said annular groove, and said main valve seal contacts said main valve seat,
20 and when it is in the non-sealing position, said main valve element is separated from said main valve seat by a predetermined distance and moved toward an inner wall surface of said accommodating chamber to bring said shielding ring into contact with the inner wall surface of
25 said accommodating chamber, whereby said main valve seal is shielded from radicals and plasma in exhaust gas by said main valve element, said shielding ring and the inner wall surface of said accommodating chamber.

6. A gate valve apparatus according to claim 1,
further comprising:

a plurality of rotary resistance valve elements
having slats on respective rotating shafts that are
5 rotatably provided in said exhaust flow path to extend in
a direction perpendicular to the axis of said exhaust flow
path, so that a flow rate through said exhaust flow path
is controlled by varying an angle of the slats of said
rotary resistance valve elements.

10 7. A gate valve apparatus according to claim 6,
wherein said rotating shafts are disposed parallel to each
other, and a plurality of pinions are each secured to one
end of each of said rotating shafts, said pinions being
meshed with a compound rack, some of said pinions being
15 meshed at one side thereof with said compound rack, and
the rest of said pinions being meshed at the other side
thereof with said compound rack, so that said some of said
pinions and the rest of said pinions rotate in opposite
directions to each other in response to a reciprocating
20 motion of said compound rack.

8. A gate valve apparatus according to claim 1,
further comprising:

a slide resistance valve element provided in said
travel space at a predetermined distance from said main
25 valve element, said slide resistance valve element being
movable in a direction perpendicular to the axis of said
exhaust flow path, so that a flow rate through said
exhaust flow path is controlled by movement of said slide

resistance valve element in the direction perpendicular to the axis of said exhaust flow path.

9. A gate valve apparatus according to claim 6 or 7, wherein a heater is installed near the pinions of said
5 rotating shafts to prevent adhesion of a by-product to the slats of said rotary resistance valve elements.

10. A gate valve apparatus according to claim 7, wherein the reciprocating motion of said compound rack is performed by a cylinder device using a metal bellows.

10 11. A gate valve apparatus according to claim 8, wherein a metal bellows is used as an actuator for moving said slide resistance valve element in the direction perpendicular to the axis of said exhaust flow path.

12. A gate valve apparatus comprising:
15 a valve body having a rectilinear exhaust flow path formed therein to extend from a chamber port to a pump port; and

a main valve provided in said valve body, said main valve including a main valve element and a main valve seat,
20 said main valve element being movable within a travel space in a direction parallel to an axis of said exhaust flow path, so that when said main valve element is in a sealing position, a main valve seal for said main valve element contacts said main valve seat to block
25 communication through said exhaust flow path, and when it is in a non-sealing position, said main valve element is separated from said main valve seat by a predetermined distance and moved in a direction perpendicular to the

axis of said exhaust flow path so as to be accommodated in an accommodating chamber;

wherein said main valve seal is provided on an abutting surface of said main valve element, and when it
5 is in the non-sealing position, said main valve element is moved toward an inner wall surface of said accommodating chamber and further moved in a direction parallel to the axis of said exhaust flow path so as to be pressed against the inner wall surface of said accommodating chamber,
10 whereby a pressing surface of said main valve element is shielded from plasma.